WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005OR65B

Title: Influence of Climate Change on Water Supply in the McKenzie River Basin: Analysis of Long-term and Spatial Hydrologic Data

Project Type: Research

Focus Categories: Climatological Processes, Water Quantity, Groundwater

Keywords: Climate Change, Snowpack

Start Date: 03/01/2005

End Date: 02/28/2006

Federal Funds: $13,725

Non-Federal Matching Funds: $27,487

Congressional District: Oregon

Principal Investigator:
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Abstract

The Oregon Cascades are the headwaters of a system that provides water to over 3 million people. Much of this water comes from snowmelt that recharges a vast groundwater aquifer, resulting in sustained spring and summer flow to major rivers such as the Willamette and Deschutes. Current climate models for the Northwest predict warmer temperatures for the Cascades will result in reduced snowpacks and decreased summer streamflow. However, in the young basaltic geology of the High Cascades, reduced snowpacks may not result in a drastic reduction of summer streamflow, since precipitation will be stored in the aquifer even if it falls as rain. This research examines the processes by which a rain or snow input to the High Cascades is transformed into streamflow, and seeks to understand the sensitivity of that process to climate change scenarios using long-term records from a High Cascade basin. The Clear Lake watershed forms the headwaters of the McKenzie River, and has precipitation, snow, and streamflow records for over 50 years. We will first quantify key components of the water balance (snowmelt, precipitation, evapotranspiration, streamflow) and assess their variability across the landscape and over time, by using remote sensing and historical data. We will then use statistical time series analysis techniques to investigate how snowpack and groundwater reservoirs cause lags in streamflow response. We hope to

develop a method of analysis that will be applied to other High Cascade basins. This research will provide the fundamental understanding necessary to accurately model water resources impacts from climate change, as well as being directly applicable in the current management of the McKenzie River basin.